

Prof. Yuch-Ning Shieh

Yuch-Ning Shieh was a foundational figure in the field of stable isotope geochemistry and a long-serving professor in the Department of Earth, Atmospheric, and Planetary Sciences (EAPS) at Purdue University from 1972-2017. Shieh, Yuch-Ning was born on February 15, 1940, in Taichung, Taiwan, Republic of China, the son of Min-chu and Hwei-Tsao (Yang) Shieh. He earned a degree in Geology from National Taiwan University, (1958-1962). He immigrated to the US from Taiwan in 1963 for his graduate studies at Caltech, which was then the epicenter of the emerging field of stable isotope geochemistry, after which he joined the Purdue faculty in 1970. He retained his Taiwan ties throughout his career as a Corresponding Research Fellow, Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan. Shieh was known for analyzing the invisible atomic signatures inside rocks to reconstruct the history of the Earth's crust. His primary tool was the isotope ratio mass spectrometer that he used for measuring the ratios of stable isotopes, particularly $^{18}\text{O}/^{16}\text{O}$. By measuring these ratios, Shieh could determine the temperature at which a rock formed and the source of the water or fluids that had interacted with it. In an era before computer modeling dominated geology, Shieh was an "isotope detective." He could look at a piece of granite and, by analyzing its oxygen signature, tell you whether it originated from melted sedimentary mud or from the Earth's deep mantle. One of Shieh's most significant contributions was investigating the genesis of granitic magmas. In the 1970s and 80s, there was intense debate about how massive bodies of granite (batholiths) formed. Shieh's isotope work demonstrated that many granites were not just fresh magma from the mantle but involved the melting of ancient, pre-existing crust. His detailed mapping of oxygen isotope variations across large geological provinces helped geologists understand the "recycling" of the Earth's crust. Shieh was a pioneer in studying how hot fluids (hydrothermal systems) alter rocks. When hot water circulates through cracks in the Earth, it leaves a distinct isotopic "fingerprint." He applied this to the study of contact metamorphism, where hot magma intrudes into cooler rock. By tracing the oxygen isotopes, he could map exactly how far the "halo" of heat and fluid extended from the magma chamber, providing crucial data for understanding how ore deposits (like gold or copper) are formed. Much of Shieh's fieldwork and sample collection focused on the Canadian Shield, specifically the Grenville Province (a billion-year-old mountain belt). His systematic analysis of these ancient rocks provided key constraints on the temperatures and pressures that existed deep in the crust during the formation of the North American continent. At Purdue, Yuch-Ning Shieh was the steward of the Stable Isotope Laboratory. For decades, this lab was a hub of activity where he trained generations of graduate students in the rigorous, delicate art of gas-source mass spectrometry. While he retired from active teaching in the early 2000s, his legacy persists in the "isotope stratigraphy" methods now standard in the field. He is remembered by colleagues and former students for the quiet, exacting precision required to extract the history of the planet from a single gram of rock powder. He will be remembered for his sincerity, sense of humor, and his great passion for science and culinary



delights. He was a dedicated family man and will be profoundly missed by his surviving family members: his wife Tiew-Leou Ni, whom he married in 1966, and two daughters Lisa and Mae-Mae.